This paper presents novel and valuable data on, and modelling of, a hydrological system that has hardly been investigated to date: rainwater-fed lenses which form on top of saline groundwater in ditch- and pipe-drained areas where overall upward flow of the saline groundwater occurs. These lenses are important to agriculture and natural vegetation. Improving understanding of these lenses through observations and modelling is relevant both from a scientific and practical perspective. The use of different observational methods in this paper to characterize the lenses over a wide range of horizontal scales and with different resolution is impressive. Methods appear generally sound, but are not always sufficiently detailed. Quality and clarity of presentation (textual) can/should be enhanced significantly.

Specific comments

This is basically a site-specific investigation. The impact of the work would be higher if the generic implications for other parts of The Netherlands and deltaic areas in general would be clarified more explicitly.

It would be good to elucidate existing concepts/ideas of shallow groundwater flow on agricultural fields a bit more extensively, for instance in section 2. The typical Dutch situation may not clear to all readers. Moreover, results/findings could refer to these ideas. For instance, fields with and without tile drainage are studied. Fig 1 is at odds with the findings that apart from the ditches also the drains attract 'seepage' water.

Information on when the various measurements were done is lacking. These appear to be momentary observations rather than results of lengthy monitoring. This is important to understand the role of the season in which data were obtained and time separation of different types of data.

The results of HEM measurements suggest very high vertical resolution. It should be explained to what extent this is truly the case. That is, what is the role of calibration/constraining and handling of equivalence.

Isn't Dmix from HEM sensitive to unsaturated zone thickness and is this sufficiently constrained?

Fresh-water heads are not appropriate to characterize vertical flow components. The authors are aware of this because they do not use fresh-water heads to track FLTP. However, they do use fresh-water heads to interpret field observations. This choice and its implications should be clarified.

Model specifics:

- How is the top system, notably ditches represented/treated in the models?
- Side boundary and boundary conditions?
- Water table tracking: deactivation of dry cells in both SEAWAT and MOCDENS3D?
- The recharge applied in the 2D models should be shown. At present the reader does not have a clue regarding magnitudes and seasonality for the 'representative' year 2005.

The authors elaborate much on the competition between free convection and forced convection ? Why this is relevant?

Conductivities and salinities from analyses are freely compared throughout this article (like in Fig 10). The patterns indeed do correspond, but what about the real values. Why are conductivities not converted to salinities using Archies law mentioned in the introduction ?

Further comments regarding presentation

The objective of the study: 'aim to gain a thorough understanding of' is not very satisfactory for lack of specificity.

I find 'seepage' to refer to upward flow at depth confusing. Seepage water would typically be the water exiting from the groundwater system, for instance in ditches or drains.

The term 'S-shaped mixing zone' has no meaning without elucidation (abstract). Apparently it refers to the shape of a chloride-depth graph. Moreover, even so, 'S' does not seem very fitting for the actual curve shape.

It is unclear what is meant by 'a sequence of alternating vertical flow directions'.

Be consistent in use of elevation/depth units and signs. -2.5 m b.m.s.l. is above mean sea level?

The word 'manifest' is used improperly in several instances. It seems the authors want to say 'show up' or 'occur'.

Refering to Dmix as rainwater lens thickness is a bit awkward as unsaturated zone is included.

p. 7659:
'areas at large geohydrological gradients'? What does this mean and what is the relation with saline groundwater reaching the surface?
focussed → focused
'We suspect ….. as shown by Maas (2007)? If shown by Maas, why uncertain?
'Unlike rainwater lenses in seepage areas, BGH-lenses …' This is nonsense. The feature you study here also develops in response to infiltration of rainwater into a saline groundwater body.

p. 7661
'Shrinkage of peat and clay …' It seems odd that in Roman times large peat cutting and dewatering led to subsidence. This area was hardly inhabited at that time. Peat cutting started much later to supply fuel and salt to the urban centres in the Late Middle ages. Peat cutting is again mentioned for the period after 1000 AD, but the paloegeographic maps at that time hardly show peat deposits (Fig 2). Please check if this is consistent with Vos and Zeiler (2008), which publication is not accessible for English speaking readership.

p. 7662:
'lithological content is heterogeneous'?
is divided from → is separated from
'from field to island scale'? What is field scale here?

p. 7663
"Ex situ" CVES what does this mean ? HEM, CVES and EM31 are all surface geophysical methods.

p. 7664:
what is depth of screen when screen has a finite length?
I miss a description of the TEC probe and the measurement principle"79 groundwater samples". From this study ?

p. 7665:
described in Goes et al. → described by Goes et al.
Average apparent resistivity. It is not an average bulk resistivty over 6 m. The upper layers contribute more than the lower ones.

p. 7666, par 3.1.6.
The ECPT's do not provide salinity but electrical conductivity profiles
The TEC probe does not measure the **apparent** conductivity (as with EM31) but the **real** resistivity of the layered subsurface.

p. 7667:
'reproduce the field measurements' Which field measurements do you mean?
'model fresh-saline processes'?

p. 7668:
'the head difference was relatively constant throughout the year' Explain what this is based on, since no extensive monitoring seems to have been conducted for this particular project.
The phreatic water level fluctuates by about 1 m according to the model (Fig 12). Given the fixed heads in the watercourses, piezometric levels will fluctuate much less. We see in fig 9 a very small difference in water level between piezometric and phreatic heads. So the head difference is likely to vary throughout the year. Would a fixed head boundary in the deep aquifer not be a better boundary condition ?

"Very low permeable layer" → "A layer with a very low permeability"

p. 7669:
'representative for annual precipitation surplus'? Is the annual (average) precipitation surplus for 2005 representative/typical? Or is the seasonality typical?
The precise form → The form (precise has no meaning here)
a clearly S-shaped mixing zone → a distinct S-shaped mixing zone

p. 7672:
salinity profiles (Fig. 8) → salinity profiles (Fig. 9)
'permanently higher'? Probably meaning head is always higher in observations.
At left ditch in Fig. 9. head info suggest downward flow. Is legend correct??

Because we deal with seasonal effects apparently, please indicate the time of measurement of the piezometric heads in fig 9. Do that for all measurements for that matter.

p. 7673:
'suitable for testing the numerical concepts and parameters' Which concepts and parameters??
'of the average, modelled, chloride concentration'. Averaged in what sense? Temporal? Spatial? Explain.

p. 7675
Lateral variation in conductivity profile is quite large at site 11. Given the footprint of the HEM of 150 m, the correspondence with point measurments by TEC is remarkable (Fig 7). Explain a bit about this foot print.

Have the HEM and CVES measurements been inverted automatically or have field data been used for optimization. How was this done. What are the degrees of freedom in inversion. Generally inversions for these kind of geophysical measurements suffer from equivalence. Belongs to Material and methods, I think.

p. 7677:
'Thus we have established that the vertical flow direction within the confining layer plays a major role in determining the depth the centre of the mixing zone'. What is meant by THE FLOW DIRECTION here? Fresh water is going down, salt water is going up. It is only shown that there is a strong CORRELATION between Dmix and FLTP. And that is not surprising is it? Dmix is deeper when the fresh water flow extends to greater depth.
'The calculated average flow velocity of the downward flow component' What is average here? Over a depth range and in time? At one depth and in time?

p. 7679:
incoming recharge → recharge
A sea level rise would cause an increase of the hydraulic head … Say that this only applies up to some finite distance from the coast.

p. 7680:
'salinity of the upward-seeping groundwater does not have a significant influence on lens characteristics' On what is this conclusion based? And what does significant mean?

7681:
Conclusions section should be shortened. Present conclusions rather than a summary of the previous and make sure the key findings stand out better. What are the key findings and what is their significance? Distinguish better what is based on observations and what on modelling as well as site-specific versus generic.

p. 7683:
‘incoming fluxes’ → dominant role of the relative magnitudes of upward saline and downward fresh-water flow
‘very vulnerable’ What is very here?
effects agriculture → affects agriculture

Figures:
Many of the figures are too small to read properly in print.
Pleasant if orientation cross sections Fig. 9 and Fig. 10 c,d,e were similar.
Caption Fig. 14: line 9 → Fig. 9